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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
WARTALOWICZ, PAUL A	
ART UNIT	**PAPER NUMBER**
1754	

DATE MAILED: 10/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/605,737	Applicant(s) ANUMAKONDA ET AL.	
	Examiner Paul A. Wartalowicz	Art Unit 1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 April 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) *29-41* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 4/6/06 have been fully considered but they are not persuasive.

Applicant traverse the election requirement on the grounds that search and examination of Groups I and II together would not present an undue burden. This argument is not persuasive for the following reasons.

Some evidence of a burden on the office to search and examine Groups I and II together is that the different Groups would necessitate different class/subclass searches. For example: Group I, but not Group II, would be searched in class 423 subclasses 650,651; Group II, but not Group I, would be searched in class 422 subclasses 201,202.

The restriction requirement is deemed PROPER and FINAL.

Applicant argues that the element of cooling the pre-reaction zone to maintain the temperature of the feed gas mixture below the flash point is not disclosed and that Examiner mistakenly equates the pre-reforming of hydrocarbon fuels, as taught by Dicks, with a pre-reaction zone, as required by Applicants and that pre-reforming is the process of converting heavier hydrocarbons present in the feed stream prior to feeding the gas to the main reactor and that it would not be obvious to merely reduce the temperature of the feed gas in the pre-reaction zone as required by Applicants. This argument is not persuasive for the following reasons.

The pre-reaction zone of the present invention does not exclude the possibility of the pre-reaction zone comprising a pre-reforming zone. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., pre-reaction zone excluding a pre-reforming zone) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The prior does not need to *merely* reduce the temperature of the feed gas in the pre-reaction zone, but needs to teach or suggest that reducing the temperature of the feed in the pre-reaction zone would be obvious to one of ordinary skill in the art. Dicks teaches that it is obvious to pre-reform at low temperatures such as 200-500°C for the purpose of avoiding carbon deposition (page 117, col. 2, lines 1-7), which meets the limitation of a process comprising a pre-reaction zone at low temperatures as necessitated by the present invention.

Applicant argues that a post-reaction zone maintained at a temperature greater than about 600 is not disclosed in the combination of cited references and specifically Sircar discloses that reactor temperatures should be maintained between 400 and 500°C and further teaches against use of higher temperatures because of the increased costs of operation necessary for more expensive metallurgy to withstand the higher temperatures. This argument is not persuasive for the following reasons.

Sircar is not relied upon to teach the temperature of the exit stream. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). That Sircar teaches against the use of higher temperatures because of the increased costs of operation necessary for more expensive metallurgy to withstand the higher temperatures is not evidence that Sircar teaches away from the teachings of Isogaya. Sircar is only relied upon to teach the motivation for keeping the temperature of the exit stream elevated compared with the reactor for the purpose of driving the reaction to completion (col. 13, lines 28-35). This teaching is applicable to Isogaya because both Sircar and Isogaya are concerned with reforming hydrocarbons, and the motivation taught by Sircar is combinable with Isogaya to render the present invention obvious to one of ordinary skill in the art. That Sircar teaches a temperature of between 400 and 500°C does not indicate that Sircar teaches away from the invention. In response to applicant's argument that Sircar teaches a temperature of between 400 and 500°C and therefore teaches away from the present invention, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, and 5-10 rejected under 35 U.S.C. 103(a) as being unpatentable over Anumakonda et al. (U.S. 6221280) in view of Dicks (Journal of Power Sources, vol. 61, pages 113-124).

Anumakonda et al. teach a process for converting hydrocarbon fuel to hydrogen and carbon monoxide as main reaction products (col. 7, lines 40-44) comprising a catalytic structure disposed in the catalytic reaction zone comprising an oxidation catalyst supported on an open channel support (col. 8, lines 6-8) wherein the reactor has a an exterior wall (reactor shell, col. 10, lines 14-17), feeding a feed gas mixture comprising air (col.9, lines 26-28) and diesel fuel (col. 9, line 4) through the inlet wherein the feed mixture is passed through a supported catalytic structure (col. 7, lines 46-48) and partially oxidized (col. 8, lines 33-34) at a temperature of 1050 ° C to produce a

gaseous mixture outlet rich in hydrogen and carbon monoxide (col. 7, lines 49-51). Anumakonda et al. fail to teach wherein the pre-reaction zone adjacent the catalytic reaction zone to maintain the temperature of the feed gas mixture below the flash point of the feed gas mixture until the feed gas mixture enters the catalytic reaction zone.

Dicks, however, teaches a process for the partial oxidation of natural gas (methane, page 113, col. 2, lines 16-20) wherein it is known in the art to pre-reform higher hydrocarbons because of hydrocarbons a propensity for carbon deposition (page 117, col. 1, lines 45-50). Dicks also teaches that pre-reform reactions are carried out at low temperatures for which carbon deposition reactions do not occur (250-500 ° C, page 117, col. 2, lines 1-7).

Therefore, it would have been obvious to one of ordinary skill in the art to provide a feed gas mixture maintained at a temperature of 250-500 ° C (below the flash point of the feed gas, page 117, col. 2, lines 1-7) in Anumakonda et al. because it is well known that higher hydrocarbons have a propensity for carbon deposition (page 117, col. 1, lines 45-50) and carbon deposition does not occur at low temperatures (250-500 ° C, page 117, col. 2, lines 1-7) as taught by Dicks in a chemically similar process of partial oxidation of hydrocarbons.

As to the limitations of a reactor shell, a pre-reaction zone, and post-reaction zone; when the prior art device is the same as a device claimed in the specification for carrying out the claimed method, it can be assumed that the device will inherently perform the claimed process. *In re King* 801 F.2d 1324, 231 USPQ 136(Fed. Cir. 1986).

Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anumakonda et al. (U.S. 6221280) in view of Dicks (Journal of Power Sources, vol. 61, pages 113-124) and Abdulally (U.S. 5567228).

Anumakonda et al. teach a process for the partial oxidation as described in claim 1. Anumakonda et al. fail to teach wherein cooling is radiant, convective or carried out with a heat exchanger.

Abdulally teaches a method for cooling pollutants such as hydrocarbons (col. 1, lines 25-26) wherein a conventional heat exchanger arranged to be either convective or radiant (col. 1, lines 32-36) for the purpose of cooling pollutants such as hydrocarbons (col. 1, lines 25-26).

Therefore, it would have been obvious to one of ordinary skill in the art to provide a method for cooling (col. 1, lines 25-26) wherein a conventional heat exchanger arranged to be either convective or radiant is arranged (col. 1, lines 32-36) in Anumakonda et al. in order to cooling pollutants such as hydrocarbons (col. 1, lines 25-26) as taught by Abdulally.

Claims 11-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anumakonda et al. (U.S. 6221280) in view of Isogaya et al. (U.S. 4331451) and Sircar et al. (U.S. 6103143).

Anumakonda et al. teach a process for converting hydrocarbon fuel to hydrogen and carbon monoxide as main reaction products (col. 7, lines 40-44) comprising a catalytic structure disposed in the catalytic reaction zone comprising an oxidation catalyst supported on an open channel support (col. 8, lines 6-8) wherein the reactor

has a an exterior wall (reactor shell, col. 10, lines 14-17), feeding a feed gas mixture comprising air (col.9, lines 26-28) and diesel fuel (col. 9, line 4) through the inlet wherein the feed mixture is passed through a supported catalytic structure (col. 7, lines 46-48) and partially oxidized (col. 8, lines 33-34) at a temperature of 1050 ° C to produce a gaseous mixture outlet rich in hydrogen and carbon monoxide (col. 7, lines 49-51). Anumakonda et al. fail to teach wherein maintaining the exit gas stream in the post-reaction zone adjacent the catalytic reaction zone at a temperature greater than about 600 ° C until the conversion of the feed gas mixture to hydrogen and carbon monoxide is substantially entirely complete.

Isogaya et al. teach a process for the partial oxidation of hydrocarbons (col. 1, lines 6-9) wherein the temperature of the exit of the catalyst bed is at least 800 ° C (col. 4, lines 47-50) for the purpose of inhibiting carbon deposition and accelerating methane decomposition (col. 4, lines 42-46).

Sircar et al. teach a process for producing hydrogen from hydrocarbons (col. 1, lines 27-32) wherein the temperature is increased toward the product end of the catalyst beds for the purpose of driving the reaction to completion (col. 13, lines 30-34).

Therefore, it would have been obvious to one of ordinary skill in the art to provide the temperature of the exit of the catalyst bed is at least 800 ° C (col. 4, lines 47-50) in Anumakonda et al. in order to inhibit carbon deposition and accelerating methane decomposition (col. 4, lines 42-46) as taught by Isogaya et al. and as is known that high temperature toward the product end of the catalyst beds drives the reaction to completion (col. 13, lines 30-34) as taught by Sircar et al.

As to the limitations of a reactor shell, a pre-reaction zone, and post-reaction zone, and a post-reaction shield; when the prior art device is the same as a device claimed in the specification for carrying out the claimed method, it can be assumed that the device will inherently perform the claimed process. *In re King* 801 F.2d 1324, 231 USPQ 136(Fed. Cir. 1986).

Claims 17-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anumakonda et al. (U.S. 6221280) in view of Dicks (Journal of Power Sources, vol. 61, pages 113-124) and Isogaya et al. (U.S. 4331451) and Sircar et al. (U.S. 6103143).

Anumakonda et al. teach a process for converting hydrocarbon fuel to hydrogen and carbon monoxide as main reaction products (col. 7, lines 40-44) comprising a catalytic structure disposed in the catalytic reaction zone comprising an oxidation catalyst supported on an open channel support (col. 8, lines 6-8) wherein the reactor has a an exterior wall (reactor shell, col. 10, lines 14-17), feeding a feed gas mixture comprising air (col.9, lines 26-28) and diesel fuel (col. 9, line 4) wherein a spray nozzle atomizer routes said diesel fuel to the catalytic reaction zone (spray nozzle atomizer introduces hydrocarbon fuel into the feed gas mixture with a fine mist, col. 9, lines 18-22) wherein a carbon to oxygen atom ratio in said feed gas mixture is from 0.5 to 1.0 (col. 9, lines 49-51) in the essential absence of water (col. 7, lines 55-56) at a rate within a range from about 0.01 ml to about 3 ml (col. 13, lines 36-38) through the inlet wherein the feed mixture is passed through a supported catalytic structure (col. 7, lines 46-48) and partially oxidized (col. 8, lines 33-34) at a temperature of 1050 ° C to produce a

gaseous mixture outlet rich in hydrogen and carbon monoxide (col. 7, lines 49-51) and the contact time is not greater than 500 milliseconds (col. 13, lines 38-41) and a liquid hourly space velocity in said catalyst is 0.5 to 75 h^{-1} (col. 11, lines 14-16). Anumakonda et al. fail to teach wherein the pre-reaction zone adjacent the catalytic reaction zone to maintain the temperature of the feed gas mixture below the flash point of the feed gas mixture until the feed gas mixture enters the catalytic reaction zone. Anumakonda et al. also fail to teach wherein maintaining the exit gas stream in the post-reaction zone adjacent the catalytic reaction zone at a temperature greater than about 600 ° C until the conversion of the feed gas mixture to hydrogen and carbon monoxide is substantially entirely complete.

As to the claimed temperature of the feed gas, Dicks teaches a process for the partial oxidation of natural gas (methane, page 113, col. 2, lines 16-20) wherein it is known in the art to pre-reform higher hydrocarbons because of hydrocarbons a propensity for carbon deposition (page 117, col. 1, lines 45-50). Dicks also teaches that pre-reform reactions are carried out at low temperatures for which carbon deposition reactions do not occur (250-500 ° C, page 117, col. 2, lines 1-7).

Therefore, it would have been obvious to one of ordinary skill in the art to provide a feed gas mixture maintained at a temperature of 250-500 ° C (below the flash point of the feed gas, page 117, col. 2, lines 1-7) in Anumakonda et al. because it is well known that higher hydrocarbons have a propensity for carbon deposition (page 117, col. 1, lines 45-50) and carbon deposition does not occur at low temperatures (250-500 ° C, page 117, col. 2, lines 1-7) as taught by Dicks in a chemically similar process of partial

oxidation of hydrocarbons. The combined teaching of Anumakonda et al. and Dicks (Journal of Power Sources, vol. 61, pages 113-124) reads on the limitation of preheating the heavy hydrocarbon fuel to a temperature greater than 180 ° C and less than the flash point of the feed gas mixture before or during introduction of the heavy hydrocarbon fuel.

As to the claimed temperature of the outlet of the reactor, Isogaya et al. teach a process for the partial oxidation of hydrocarbons (col. 1, lines 6-9) wherein the temperature of the exit of the catalyst bed is at least 800 ° C (col. 4, lines 47-50) for the purpose of inhibiting carbon deposition and accelerating methane decomposition (col. 4, lines 42-46).

Sircar et al. teach a process for producing hydrogen from hydrocarbons (col. 1, lines 27-32) wherein the temperature is increased toward the product end of the catalyst beds for the purpose of driving the reaction to completion (col. 13, lines 30-34).

Therefore, it would have been obvious to one of ordinary skill in the art to provide the temperature of the exit of the catalyst bed is at least 800 ° C (col. 4, lines 47-50) in Anumakonda et al. in order to inhibit carbon deposition and accelerating methane decomposition (col. 4, lines 42-46) as taught by Isogaya et al. and as is known that high temperature toward the product end of the catalyst beds drives the reaction to completion (col. 13, lines 30-34) as taught by Sircar et al.

As to the limitations of a reactor shell, a pre-reaction zone, and post-reaction zone; when the prior art device is the same as a device claimed in the specification for

carrying out the claimed method, it can be assumed that the device will inherently perform the claimed process. *In re King* 801 F.2d 1324, 231 USPQ 136(Fed. Cir. 1986).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul A. Wartalowicz whose telephone number is (571) 272-5957. The examiner can normally be reached on 8:30-6 M-Th and 8:30-5 on Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Paul Wartalowicz
October 4, 2006

COLLEEN P. COOKE
PRIMARY EXAMINER